Mental Health Status Among Rural Women of Reproductive Age: Findings From the Central Pennsylvania Women's Health Study

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Research on the mental health of rural women in the United States is sparse.[1] Although some aspects of rural life—such as a slower pace and smaller, more tight-knit communities—are thought to be conducive to mental health, other aspects of rural life are stressful, especially for women. For example, women in rural areas may have fewer opportunities to participate in paid employment, may have restricted social contacts, or may have less access to social services and health care compared with women in more urbanized areas. In this study, we examined the variables associated with the mental health status of rural women of reproductive age, for whom mental morbidity could be important both for their own health and for the well-being of their children and families.

Although rural areas vary with respect to population size, sociodemographic composition, cultural context, and socioeconomic factors, several generalizations can be made. First, because rural residents are disproportionately poor,[2] rural women are likely to experience numerous stressors related to mental health problems. These stressors include economic deprivation, lack of job benefits such as health insurance, and social isolation in the smallest rural communities. Other aspects of small rural communities that might affect women's mental health include the reinforcement of traditional gender roles, which can result in limiting women's participation in employment or higher education and in creating barriers to women's access to shelters or other social services for victims of intimate partner violence.[3]

Some literature suggests that farm residents are at higher risk for health and mental health problems compared with nonfarm residents. Although some of these studies focus on the risk of suicide and farm-related injuries among men, it is noteworthy that many

Objectives. We sought to examine variables associated with mental health among rural women of reproductive age, with particular attention given to rural area type and farm residence.

Methods. We analyzed data from the Central Pennsylvania Women's Health Study, which included a random-digit-dialed survey of women aged 18 to 45 years. Hierarchical multiple linear and logistic regression models were estimated to predict 3 mental health outcomes: score on a mental health measure, depressive symptoms, and diagnosed depression or anxiety.

Results. Mental health outcomes were associated with different factors. Farm residence was associated with higher mental health score, and the most isolated rural residence was associated with less diagnosed depression or anxiety. Elevated psychosocial stress was consistently significant across all models. A key stress modifier, self-esteem, was also consistently significant across models. Other variables associated with 2 of the outcomes were intimate partner violence exposure and affectionate social support.

Conclusions. Farm residence may be protective of general mental health for women of reproductive age, and residence in isolated rural areas may decrease access to mental health screening and treatment, resulting in fewer diagnoses of depression or anxiety. (*Am J Public Health.* 2008;98:1271–1279. doi:10.2105/AJPH.2006.107771)

women who reside on farms are involved in farm work to some degree, and all women who reside on farms are involved in caregiving of family members engaged in farm work. The mental health risks to women of living on a farm and direct involvement in farming might include stressors such as the economic uncertainty of farming, low levels of job demand and control, lack of external recognition for their work, fatigue, emotional and social isolation, and the trauma associated with injuries and functional impairments.[3–5]

Although some studies have suggested that rural residence generally is not associated with higher levels of mental health problems compared with urban residence, with the exception of suicide among males,[2,6,7] depression prevalence has been found to be slightly higher among residents of rural areas compared with residents of urban areas.[8] Studies also showed that women consistently report higher levels of mental distress compared with men, regardless of place of residence.

Also, to the extent that rural women, compared with urban women, have higher rates of some chronic conditions, such as obesity, and more limitations of activity caused by chronic conditions,[2] they might be expected to experience greater levels of comorbid depression. A better understanding of the determinants of rural women's mental health problems is needed to identify appropriate targets for interventions.

Furthermore, because rural areas are often medically underserved, access to screening and treatment services for mental health problems is lower in rural areas, reducing the likelihood of diagnosis and receipt of needed care.[9–12] In particular, rural areas compared with urban areas have less availability of specialty mental health services, including mental health providers such as psychiatrists, child psychiatrists, and psychologists as well as inpatient psychiatric services.[13]

Little research has focused on women's mental health in various types of rural

communities, comparing isolated areas with more populous rural areas. In this study, we examined 3 mental health outcomes among rural women of reproductive age living in these types of communities, with a focus on aspects of psychosocial stress and potential stress modifiers. Psychosocial stressors included acute or chronic demands or challenges as appraised by women, such as living in poverty or being exposed to domestic violence or discrimination on the basis of race/ethnicity or gender, which may affect their mental health and functioning. Stress modifiers included factors that have been found in previous research to buffer or exacerbate the individual's response to stress, including religiousness or spirituality,[14] self-esteem,[15] and social support.[16] We examined the following 3 research questions: (1) What are the correlates of mental health status among rural women of reproductive age? (2) Do modifiers of psychosocial stress, including religiousness, self-esteem, and social support, alter the effects of other predictors on mental health outcomes? (3) Does the type of rural residential setting or residence on a farm affect women's mental health status after we controlled for other variables?

On the basis of findings from previous mental health research, we hypothesized that rural women's mental health status would be adversely affected by psychosocial stressors. We also expected that stress modifiers would reduce the effect of these stressors on mental health outcomes. In view of rural women's potentially reduced access to social, economic, and health care resources, as well as the limited literature linking farm residence to mental health problems among rural men, we hypothesized that residing in more isolated rural settings and on farms would be associated with less optimal mental health outcomes among women in our sample.

METHODS

Sample

We obtained our sample from the Central Pennsylvania Women's Health Study, which included a random-digit-dialed telephone survey of 2002 women aged 18 to 45 years, both English and Spanish speaking, from a 28-county, largely rural region of Pennsylvania. The sampling approach included oversamples

of telephone numbers in rural counties and areas with relatively large minority populations. Conducted during a 7-month period in 2004 to 2005, the survey had a response rate of 52% (calculated per American Association for Public Opinion Research[17] recommendations as the number of complete interviews divided by number of eligible reporting units in the sample; an estimated proportion eligible was used among households of unknown eligibility); the cooperation rate was 63% (calculated as the proportion of women interviewed among all eligible units ever contacted[17]). These rates were consistent with recent random-digit-dialed survey trends as discussed by Curtin et al.[18] The sample was highly representative of the target population on key demographics (age, race/ethnicity, educational level, and poverty). Further details of the Central Pennsylvania Women's Health Study sample and survey design have been previously published.[19]

For this analysis, the sample was restricted to the 764 women who participated in the Central Pennsylvania Women's Health Study survey and who resided in rural areas, as defined according to zip code–based Rural–Urban Commuting Area Codes (RUCA version 2.0).[20,21] The RUCA taxonomy is a classification system based on the sizes of cities and towns and daily commuting patterns. For purposes of health-related research, the Washington, Wyoming, Alaska, Montana, and Idaho Rural Health Research Center recommends that rural RUCA codes be categorized according to a 3-level hierarchy: (1) large rural city- or town-focused areas, which have primary commuting flows within an urban cluster of 10 000 to 49 999 people; (2) small rural town-focused areas, which have primary commuting flows within an urban cluster of 2500 to 9999 people; and (3) isolated small rural town-focused areas, which have primary commuting flows outside of an urban cluster.[22] These 3 categories range from least to most rural. Our analytic sample contained sufficient numbers of rural women within each of these 3 types of rural areas for analysis according to degree of rurality.

Measures

The dependent variables for this analysis were 3 measures of mental health status: the

Short Form 12, version 2 (SF-12v2) Mental Component Summary measure, depressive symptoms, and diagnosis of depression and anxiety.

SF-12v2 Mental Component Summary measure. This measure (a standard 4-week recall form) is a weighted aggregation of 8 SF-12v2 scales measuring distinct health constructs (physical functioning, physical role, bodily pain, general health, vitality, social functioning, emotional role, and mental health). In the scoring of the Mental Component Summary, greater weight is given to the mental health, role-emotional, social functioning, and vitality scales, which include questions about feeling calm and peaceful, feeling downhearted and depressed, daily and social activities limited by emotional problems, and energy level during the past 4 weeks. The measure is therefore a more global measure of mental health than a measure focusing on a specific mental health problem such as depression. The means and standard deviations used in scoring come from the 1998 general US population, and the factor score coefficients come from the 1990 general US population. A linear *t*-score transformation method is used so that the summary score has a mean of 50 and a standard deviation of 10.[23] A higher score indicates more-optimal mental health. In the analytic sample, the mean score was 48.9 (SD = 10.0). Mean scores did not differ significantly by type of rural area in our sample.

Depressive symptoms. This 6-item scale assessed the frequency of feeling depressed, having restless sleep, enjoying life, having crying spells, feeling sad, and feeling that people disliked oneself in the past week, derived from items from the Center for Epidemiologic Studies Depression Scale.[24] We used a dichotomous indicator of high risk for psychological distress, particularly depression, with a cutpoint of 4 as defined and validated by Sherbourne et al.[25] This measure has been used in numerous studies of women's health to indicate probable depression. In the analytic sample, 21.5% of the sample had scores indicating elevated psychological distress. This is comparable to the percentage reporting psychological distress (21.5%) in the Commonwealth Fund 1998 Survey of Women's Health based on a national sample.[26] The percentage did not differ significantly by type of rural area in our sample.

Diagnosis of depression or anxiety. This dichotomous measure indicated whether the woman reported receiving a diagnosis of "anxiety or depression" from "a doctor or other health care professional" in the past 5 years. Unlike the previous measures, which were based on respondents' reports of their own health, this measure also captures the respondent's interaction with the health care delivery system. In the analytic sample, 28.1% reported having received a diagnosis of anxiety or depression in the past 5 years, which is higher than the percentage (15.8%) reported in the Commonwealth Fund 1998 Survey of Women's Health.[26] The percentage diagnosed did not differ significantly by type of rural area in our sample.

Independent variables included 2 measures of rurality. RUCA codes are defined earlier in this article for 3 types of rural areas and whether the woman lives on a farm. Measures of psychosocial stress include (1) the Psychosocial Hassles Scale,[19,27] a 12-item scale measuring the degree to which common problems, such as money worries and problems with friends, were perceived as stressful during the past 12 months (rated on a 4-point scale ranging from "no stress" to "severe stress"; scale scores were dichotomized at the median); (2) exposure to any form of intimate partner violence, according to an 8-item scale assessing violence during the past 12 months adapted from the Conflict Tactics Scale[28] and used in the Commonwealth Fund 1998 Survey of Women's Health[26]; and (3) whether the respondent experienced any unfair treatment on the basis of gender or race/ethnicity in the past 12 months in 1 or more of the following domains: getting a job, at work, at school, getting housing, getting medical care, on the street or in a public setting, or by police or in the courts. The discrimination assessment was based on previous research by Krieger and Sidney[29] that documented whether participants responded yes or no regarding ever experiencing discrimination in each of these domains.

Three potential stress modifiers include (1) frequency of attending religious services in a typical month, a measure of religiousness; (2) the Rosenberg Self-Esteem Scale,[30] consisting of 10 items such as "I feel that I have a number of good qualities" to which respondents

TABLE 1—Distribution of Independent Variables and Bivariate Associations With Mental Health Outcomes Among Rural Women of Reproductive Age (N = 764): Central Pennsylvania Women's Health Study, 2004–2005

	% (No.)	SF-12v2 Mental Health Score, P	Depressive Symptoms, P	Diagnosed Depression or Anxiety, P
Rurality				
Classification of residence area[a]				
Large, rural, city or town focused	57.7 (441)			
Small, rural, town focused	13.1 (100)			
Isolated, small, rural, town focused	29.2 (223)			
Lives on a farm				
Yes	9.8 (75)	.006 (+)		
No	90.1 (688)			
Psychosocial stress				
Psychosocial Hassles Scale Score				
High stress (> median score)	44.6 (341)	<.001 (−)	<.001 (+)	<.001 (+)
Low stress (≤ median score)	55.4 (423)			
Exposure to intimate partner violence, past 12 mo	5.1 (39)	<.001 (−)	<.001 (+)	<.001 (+)
Experienced unfair treatment because of gender or race/ethnicity, past 12 mo	22.3 (170)	<.001 (−)	.004 (+)	<.001 (+)
Modifiers of psychosocial stress				
Attendance at religious services				
0–1 times/mo	48.4 (370)	.01 (−)	.004 (+)	.002 (+)
≥ 2 times/mo	51.6 (394)			
Rosenberg Self-Esteem Scale Score				
≤ 30 (lower self-esteem)	34.6 (264)	<.001 (−)	<.001 (+)	<.001 (+)
> 30 (higher self-esteem)	65.4 (500)			
Low social support[b]				
Tangible support	56.4 (431)	<.001 (−)	<.001 (+)	<.001 (+)
Affectionate support	30.8 (235)	<.001 (−)	<0.001 (+)	<.001 (+)
Emotional support	40.1 (306)	<.001 (−)	<.001 (+)	.01 (+)
Interaction support	51.0 (390)	<.001 (−)	<.001 (+)	.01 (+)
Physical health				
Hypertension, past 5 y	10.2 (78)		<.001 (+)	.03 (+)
Obesity (calculated body mass index ≥ 30 kg/m^2)	25.4 (190)	.001 (−)	<.001 (+)	.05 (+)
Diabetes, past 5 y	2.0 (15)	.03 (−)	.002 (+)	.005 (+)
Experienced gap in health insurance, past 12 mo				
Yes	19.2 (147)			
No	80.8 (617)			
Sociodemographic characteristics				
Age, y				
18–34	47.8 (365)			
35–45	52.0 (397)			
Educational attainment				
High school or less	45.0 (344)			
Some college or more	55.0 (420)			
Race/Ethnicity				
White, non-Hispanic	96.5 (737)			
Other race/ethnicity	3.4 (26)			

Continued

TABLE 1—Continued

Marital status				
Not married or partnered	19.4 (148)	<.001 (−)	.04 (+)	.02 (+)
Married or partnered	80.4 (614)			
Employment				
Not employed	25.8 (197)		<.001 (+)	<.001 (+)
Employed (full or part time)	74.2 (567)			
Poverty status				
In poverty or near poverty (≤200% federal poverty threshold)	34.4 (226)	.002 (−)	<.001 (+)	.001(+)
Not in poverty (>200% federal poverty threshold)	65.7 (432)			

Note. SF-12v2 = Short Form 12, version 2, Mental Health Component Summary. Empty cells denote nonsignificance. Plus and minus signs indicate the direction of the bivariate relation. See "Methods" section for details on measures.
[a]Rural–Urban Commuting Area code classification.
[b]Score was more than the median on Modified Medical Outcomes Survey Social Support Scale.

were asked to strongly agree, agree, disagree, or strongly disagree (scores ranged from 10 to 49 and were dichotomized as lower [≤30] and higher [>30] self-esteem); and (3) 4 types of social support (tangible, affectionate, emotional or informational, and interaction) measured with the Medical Outcomes Survey social support scale,[31] modified to reduce respondent burden to contain 2 items from each of the 4 support domains in the original scale. Additional covariates included 3 measures of physical health that would be expected to be associated with greater mental morbidity (having a diagnosis in the past 5 years of hypertension or diabetes, and obesity as measured by body mass index [BMI; ≥30 kg/m²]); 1 measure of health care access (having any gap in health insurance coverage during the past 12 months), which would be expected to be associated with seeking care for mental morbidity; and relevant sociodemographics (age, educational level, race/ethnicity, marital status, employment for pay, and poverty level quantified as at or below 200% of the federal poverty threshold on the basis of household size and composition).

Analysis

Methods included simple descriptive statistics (means, standard deviations, proportions, and measures of association, including the Spearman rank correlation coefficient and χ^2 tests) as well as multivariate regression methods, including both ordinary least squares

and logistic regression models, depending on the form of the dependent variable. In both types of models, categorization of variables was extensively used to make regression coefficients easily understandable. Adjusted odds ratios derived from multiple logistic regression models represent the risk of outcome associated with category membership. Because the potential stress modifiers were expected to alter the effect of other variables on the mental health outcomes, for each outcome we used hierarchical regression analysis. All predictors except for the stress modifier variables were entered in the first step; the stress modifiers were then added in the second step.

To test whether the addition of the modifiers had a significant effect on model fit, the F test computed by the method of conditional error was used to determine whether the R^2 values for the 2 linear models were significantly different from one another. For the logistic regression models, the equivalent comparison was done by computing the difference in log likelihoods between the 2 models and evaluating the difference (times−2) with the Wald test. All analyses were performed with SAS statistical software version 9.1 (SAS Institute Inc, Cary, North Carolina).

RESULTS

Descriptive information about the variables in our analytic sample is presented in the first column of Table 1. Slightly more than half of

the sample lived in large rural city- or town-focused areas, with the remainder split among small rural town-focused and isolated small rural town-focused areas. About 10% of the women lived on farms. Farm residence varied significantly across the 3 types of rural areas (*P*=.003), with 15% of those in isolated small rural town-focused areas living on farms, compared with 12% of those in small rural town-focused areas and 7% of those in large rural city- or town-focused areas (results not shown).

Addressing the first research question, Table 1 presents bivariate associations between the independent variables and mental health outcomes. Contrary to expectations, living on a farm was positively associated with a higher (more optimal) SF-12v2 mental health score. The hypothesized negative associations were found, however, between the mental health score and the indicators of psychosocial stress (higher stress as reflected in the Psychosocial Hassles score and exposure to intimate partner violence and discrimination), as well as lower levels of stress modifiers, including religiousness, self-esteem, and social support. Associations also were seen between lower SF-12v2 mental health score and the presence of health conditions, including obesity and diabetes, being unmarried, and living in poverty or near poverty. The other outcomes of interest, presence of depressive symptoms and diagnosis of anxiety or depression, were also significantly associated with each of the stressor and stress modifier variables; with each identified physical health condition; and with being unmarried, being unemployed, and living in poverty or near poverty.

Tables 2 through 4 present multivariate regression results for each of the 3 mental health outcomes of interest. To address our second research question—do modifiers of psychosocial stress, including religiousness, self-esteem, and social support, alter the effects of other predictors on mental health outcomes?—each table includes results from models not including stress modifiers (step 1) and full models with stress modifiers added (step 2).

Table 2 shows results of the hierarchical ordinary least squares regression analyses of the SF-12v2 Mental Component Summary Score. In the first step, several variables are significantly associated with less optimal mental health, including elevated psychosocial stress,

exposure to intimate partner violence, and living in poverty or near poverty. Stress and intimate partner violence remained significant with the addition of the modifiers in the second step; however, the effect of the poverty variable was reduced to nonsignificance. In the second step, a statistically significant effect for farm residence (P=.05) was also seen. Thus, net of other variables, living on a farm appears protective of mental health in this sample. The statistically significant stress modifiers included self-esteem and level of affectionate social support: low self-esteem and low affectionate support were associated with poorer mental health status, and their inclusion reduced the effects of stress and intimate partner violence on mental health. The addition of the stress modifiers improved model fit (P<.001).

Elevated psychosocial stress, diagnosed hypertension, not being employed, and living in poverty or near poverty were associated with significantly elevated odds of experiencing depressive symptoms, as shown in the step-1 model in Table 3. Type of rural area and residing on a farm had no effect in this model. The addition of the stress modifiers in step 2 reduced the effect of employment status such that it was no longer statistically significant. Among the stress modifiers, low self-esteem was significantly associated with greater likelihood of depressive symptoms. As evidenced by the significant difference in log likelihoods between the 2 models, the addition of the stress modifiers significantly improved model fit (P<.001).

Table 4 presents results for diagnosed anxiety or depression in the past 5 years. Consistent with analyses of the other mental health outcomes, elevated psychosocial stress was associated with a greater likelihood of diagnosed anxiety or depression. Other significant variables included exposure to intimate partner violence, not being employed, and residence in large rural city- or town-focused and small rural town-focused areas compared with isolated small rural town-focused areas. With the addition of the stress modifiers in the step 2 model, all of these variables remained significant, with the exception of residence in large rural city- or town-focused areas, and the effect of psychosocial stress was somewhat reduced. Significant stress modifiers included self-esteem and affectionate support. The addition of the stress

modifiers in step 2 significantly improved model fit (P<.001).

The third research question addressed whether the type of rural residential setting or residence on a farm affected women's mental health status after we controlled for other variables. Taken together, the results in Tables 2 through 4 indicate that residence in

less isolated rural settings was associated with one of the mental health outcomes: diagnosed anxiety or depression. Farm residence, on the other hand, was found to be significantly associated with higher SF-12v2 mental health scores in the full model. We estimated each of the models shown in Tables 2 through 4, testing for interaction effects between farm

TABLE 2—Results of Ordinary Least Squares Regression Analysis of SF-12v2 Mental Component Summary Score: Central Pennsylvania Women's Health Study, 2004–2005

	Step 1: Model Excluding Stress Modifiers		Step 2: Model Including Stress Modifiers	
	Parameter Estimate	P	Parameter Estimate	P
Rurality				
Large, rural, city- or town-focused vs isolated, small, rural, town-focused area of residence	–0.55	.494	–0.41	.576
Small, rural, town-focused vs isolated, small, rural, town-focused area of residence	1.03	.365	0.43	.681
Residence on a farm vs nonfarm residence	1.47	.197	2.06	.05
Psychosocial stress				
High stress vs low stress on Psychosocial Hassles Scale	–6.32	<.001	–5.05	<.001
Exposure to intimate partner violence vs no exposure to intimate partner violence, past 12 mo	–6.19	<.001	–3.87	.011
Experienced unfair treatment vs no experience of unfair treatment because of gender or race/ethnicity, past 12 mo	–1.24	.156	–1.03	.201
Physical health				
Hypertension vs no hypertension	–0.79	.503	–0.68	.529
Obesity vs no obesity (calculated as body mass index ≥ 30 kg/m^2)	–1.30	.117	–1.02	.180
Diabetes vs no diabetes	–2.22	.393	–2.27	.344
Health care access				
Gap in health insurance vs no gap, past 12 mo	0.65	.484	0.04	.960
Sociodemographic characteristics				
Aged 35–45 y vs 18–34 y	–0.41	.574	–0.04	.952
High school graduate or less vs some college or more	–0.31	.678	0.28	.685
Other race/ethnicity vs non-Hispanic White	2.54	.165	2.33	.167
Not married or partnered vs married or partnered	–1.34	.148	0.41	.636
Not employed vs employed	–1.37	.100	–0.89	.248
In poverty or near poverty vs not in poverty	–2.03	.014	–1.43	.062
Modifiers of psychosocial stress				
Attendance at religious services ≤ 1 time/mo vs ≥ 2 times/mo			–1.16	.076
Rosenberg Self-Esteem Score: ≤ 30 vs > 30			–3.96	<.001
Low vs high social support				
Tangible support			–0.87	.292
Affectionate support			–5.19	<.001
Emotional support			–0.56	.573
Interaction support			0.55	.551

Note. Parameter estimates are unstandardized. SF-12v2 = Short Form 12, version 2, Mental Health Component Summary. The model fit statistics were as follows. Step 1, R^2 = 0.21; $F_{16, 623}$ = 10.60; P < .001. Step 2, R^2 = 0.34; $F_{22, 617}$ = 14.59; P < .001. For the difference between step-1 and -2 models, $F_{6, 617}$ = 20.1; P < .001.

TABLE 3—Results of Multiple Logistic Regression Predicting Depressive Symptoms Among Rural Women of Reproductive Age (N = 644): Central Pennsylvania Women's Health Study, 2004–2005

	Step 1 Model,[a] OR (95% CI)	Step 2 Model,[b] OR (95% CI)
Rurality		
Large, rural, city- or town-focused vs isolated, small, rural, town-focused area of residence	0.74 (0.47, 1.18)	0.74 (0.45, 1.21)
Small, rural, town-focused vs isolated, small, rural, town-focused area of residence	0.64 (0.33, 1.26)	0.77 (0.37, 1.62)
Residence on a farm vs nonfarm residence	0.77 (0.36, 1.63)	0.67 (0.30, 1.49)
Psychosocial stress		
High stress vs low stress on Psychosocial Hassles Scale	3.57 (2.28, 5.58)	3.27 (2.02, 5.29)
Exposure to intimate partner violence vs no exposure to intimate partner violence, past 12 mo	2.25 (0.97, 5.24)	1.94 (0.78, 4.84)
Experienced unfair treatment vs no experience of unfair treatment because of gender or race/ethnicity, past 12 mo	1.29 (0.79, 2.10)	1.29 (0.77, 2.15)
Physical health		
Hypertension vs no hypertension	2.23 (1.19, 4.18)	2.53 (1.27, 5.06)
Obesity vs no obesity (calculated body mass index ≥ 30 kg/m^2)	1.37 (0.87, 2.18)	1.31 (0.80, 2.14)
Diabetes vs no diabetes	1.97 (0.55, 7.06)	1.87 (0.46, 7.64)
Health care access		
Gap in health insurance vs no gap, past 12 mo	0.62 (0.36, 1.08)	0.69 (0.38, 1.25)
Sociodemographic characteristics		
Aged 35–45 y vs 18–34 y	1.18 (0.76, 1.83)	1.28 (0.80, 2.06)
High school graduate or less vs some college or more	1.13 (0.73, 1.75)	0.97 (0.60, 1.56)
Other race/ethnicity vs non-Hispanic White	0.51 (0.14, 1.90)	0.49 (0.12, 1.94)
Not married or partnered vs married or partnered	1.17 (0.70, 1.96)	0.86 (0.49, 1.50)
Not employed vs employed	1.64 (1.03, 2.62)	1.47 (0.90, 2.42)
In poverty or near poverty vs not in poverty	2.11 (1.31, 3.39)	2.09 (1.25, 3.48)
Modifiers of psychosocial stress		
Attendance at religious services ≤ 1 time/mo vs ≥ 2 times/mo		1.12 (0.71, 1.76)
Rosenberg Self-Esteem Score: ≤ 30 vs > 30		4.32 (2.74, 6.82)
Low vs high social support		
Tangible support		0.98 (0.54, 1.79)
Affectionate support		1.60 (0.86, 3.00)
Emotional support		0.80 (0.41, 1.56)
Interaction support		1.46 (0.76, 2.81)

Note. OR = odds ratio; CI = confidence interval; −2LL = log likelihood × −2. Log likelihood values are used in calculating the likelihood ratio test statistic. The model fit statistics were as follows. Step 1, −2LL = 576.758; χ^2_{16} = 100.174; $P < .001$. Step 2, −2LL = 519.302; χ^2_{22} = 157.630; $P < .001$. For the difference between step-1 and -2 models, the likelihood ratio test statistic = 57.456; df = 6; $P < .001$.
[a]Excludes stress modifiers.
[b]Includes stress modifiers.

residence and type of rural setting, and no statistically significant interactions were found.

DISCUSSION

This analysis examined variables associated with mental health status in a representative sample of rural women of reproductive age; the 3 indicators of mental health were the SF-12v2 Mental Component Summary score, depressive symptoms, and diagnosis of anxiety or depression in the past 5 years. Unlike other studies of rural mental health, which typically compare rural and urban residents, our data set permitted examination of 3 types of rural areas and residence on a farm in relation to mental health.

The findings suggested that living on a farm, independent of poverty and other sociodemographics, may be marginally protective of overall mental health as measured by the SF-12v2 mental health score; alternatively, women with greater mental health may choose to live on farms in this region of central Pennsylvania. This result is somewhat contradictory to the limited literature on farm residence and men's mental health,[3–5] suggesting that the relation between residence on a farm and general mental health requires further investigation among women.

In addition, receiving a diagnosis of anxiety or depression is more likely in women residing in larger rural areas, compared with the most isolated rural areas. This likely reflects less access to health care services, and hence to diagnosis, in the most isolated rural areas, but other explanations are possible. Fewer diagnoses in isolated rural areas could reflect less inclination to seek health care for depressive symptoms in those areas because of prevailing norms of self-reliance, for example, or it could reflect a lower underlying level of depression because of a protective effect of rural isolation for women in this age group. The latter interpretation might be regarded as consistent with the finding that living on a farm is associated with overall better mental health in this sample, but there was no evidence in this study that depressive symptomatology was present less often among isolated rural women.

Resolving the possible explanations for our findings regarding rurality of residence is important because alternative explanations would lead to different public health interventions. For example, if living in the most isolated rural areas or on farms were protective of women's mental health, including anxiety and depression, then services designed to provide social support or other resources, or to improve mental health screening and treatment services, could be targeted to larger, more-populous rural areas. On the other hand, if women in the most isolated rural areas had the same level of underlying mental morbidity as women in less isolated rural areas but experienced greater barriers to screening and diagnostic services,

TABLE 4—Results of Multiple Logistic Regression Predicting Diagnosed Anxiety or Depression Among Rural Women of Reproductive Age (N = 644): Central Pennsylvania Women's Health Study, 2004–2005

	Step 1 Model,[a] OR (95% CI)	Step 2 Model,[b] OR (95% CI)
Rurality		
Large, rural, city- or town-focused vs isolated, small, rural, town-focused area of residence	1.58 (1.01, 2.45)	1.54 (0.98, 2.44)
Small, rural, town-focused vs isolated, small, rural, town-focused area of residence	1.83 (1.01, 3.34)	2.10 (1.12, 3.93)
Residence on a farm vs nonfarm residence	1.02 (0.54, 1.92)	0.92 (0.48, 1.77)
Psychosocial stress		
High stress vs low stress on Psychosocial Hassles Scale	3.03 (2.04, 4.48)	2.88 (1.91, 4.35)
Exposure to intimate partner violence vs no exposure to intimate partner violence, past 12 mo	2.88 (1.26, 6.58)	2.98 (1.25, 7.14)
Experienced unfair treatment vs no experience of unfair treatment because of gender or race/ethnicity, past 12 mo	1.47 (0.95, 2.28)	1.50 (0.96, 2.36)
Physical health		
Hypertension vs no hypertension	1.44 (0.78, 2.63)	1.61 (0.86, 3.04)
Obesity vs no obesity (calculated body mass index ≥ 30 kg/m^2)	1.24 (0.81, 1.90)	1.16 (0.75, 1.81)
Diabetes vs no diabetes	2.19 (0.63, 7.65)	2.24 (0.60, 8.35)
Health care access		
Gap in health insurance vs no gap, past 12 mo	0.85 (0.52, 1.38)	0.85 (0.51, 1.41)
Sociodemographic characteristics		
Aged 35–45 y vs 18–34 y	1.11 (0.75, 1.63)	1.18 (0.79, 1.77)
High school graduate or less vs some college or more	0.84 (0.56, 1.25)	0.67 (0.44, 1.03)
Other race/ethnicity vs non-Hispanic White	0.87 (0.31, 2.42)	0.83 (0.28, 2.40)
Not married or partnered vs married or partnered	1.16 (0.73, 1.85)	0.98 (0.60, 1.60)
Not employed vs employed	1.71 (1.11, 2.63)	1.67 (1.07, 2.62)
In poverty or near poverty vs not in poverty	1.47 (0.95, 2.26)	1.54 (0.98, 2.42)
Modifiers of psychosocial stress		
Attendance at religious services ≤ 1 time/mo vs ≥ 2 times/mo		1.45 (0.98, 2.15)
Rosenberg Self-Esteem Score: ≤ 30 vs > 30		2.41 (1.60, 3.62)
Low vs high social support		
Tangible support		1.29 (0.78, 2.12)
Affectionate support		1.82 (1.02, 3.24)
Emotional support		0.58 (0.32, 1.07)
Interaction support		0.74 (0.42, 1.30)

Note. OR = odds ratio; CI = confidence interval; −2LL = log likelihood × −2. Log likelihood values are used in calculating the likelihood ratio test statistic. The model fit statistics were as follows. Step 1, −2LL = 689.385; $\chi^2_{16} = 86.615$; $P < .001$. Step 2, −2LL = 657.763; $\chi^2_{22} = 118.237$; $P < .001$. For the difference between step-1 and -2 models, the likelihood ratio test statistic = 31.62; $df = 6$; $P < .001$.
[a]Excludes stress modifiers.
[b]Includes stress modifiers.

then outreach services to women in the most isolated rural areas would be called for.

Other variables associated with mental health status differed depending on the outcome analyzed. The variable most consistently associated with poorer mental health was higher psychosocial stress, as reflected in the Psychosocial Hassles Scale score, which was robust across all models. A key modifier of this stress, self-esteem, also was robust across models. Women with the lowest level of self-esteem had consistently poorer mental health, and evidence indicated that higher self-esteem and affectionate social support (i.e., "having someone who shows you love and affection," "having someone to love and make you feel wanted") buffered the effect of stress on mental health.

Implications for Future Research

These findings have several implications for future research. First, the consistent effect of psychosocial stress on mental health suggests not only that the stresses of daily living may be importantly related to mental health among rural women but also that we need a clearer understanding of what constitutes psychosocial stress among rural women. The items in the Psychosocial Hassles Scale tap perceived stress stemming from a range of common problems (e.g., money worries, problems with family or friends, abuse, work-related problems, feeling generally overloaded), but our study cannot inform us about the origins, duration, or intensity of these stresses over time. In addition, our findings suggest that self-esteem is importantly related to mental health for rural women, but it is not apparent how living in a rural area affects the development of self-esteem, because the possibility that women with higher self-esteem may choose to live in certain types of rural areas cannot be ruled out.

Some negative findings are noteworthy. Despite suggestions in the literature,[32–34] neither attendance at religious services nor indicators of tangible or interaction social support had significant effects on mental health status. This suggests that these factors are not important stress modifiers in this rural sample. In addition, although much previous research has focused on access to health care as a barrier to mental health services in rural populations, a key measure of access—having a gap in health insurance coverage at any time in the past year (affecting 19% of the sample)—was not associated with the outcome measures, including receiving a diagnosis for anxiety or depression in the past 5 years. Because most of the women in this sample reside in medically underserved areas, this negative finding could reflect the differing time frames of the measures (1 year for health insurance gap and 5 years for diagnosis), which is a limitation of this data set.

This study had several other limitations. The data were cross-sectional, so causal direction between determinants and mental health status could not be inferred. The data were from a sample of 764 rural women, and replication of these analyses in a larger sample would provide further information about the strength of the findings. In addition, the data were all self-reported, and we had no corroborating evidence of mental health diagnoses. Because of the underlying sociodemographics of this central Pennsylvania region, the number of women who were not non-Hispanic White was small; this could have accounted for the lack of statistically significant associations between race/ethnicity and mental health in these analyses. Finally, we examined rurality of current residence, and although the target population was relatively stable, our data did not permit investigation of duration of rural residence effects on mental health status.

Also, note that characteristics of farms and farming in Pennsylvania differ in some respects from other areas of the United States, suggesting that generalizing the findings should be done with caution. According to the 2002 US Census of Agriculture,[35] for example, the average size of a Pennsylvania farm is less than the US average (133 vs 441 acres). The corresponding net cash farm income is also smaller, averaging $14 853 in Pennsylvania compared with $19 032 nationwide. Family-ownership rates are similar, however, with 91.6% of Pennsylvania farms owned by families or individuals compared with 89.7% of US farms overall.

Conclusions

In this study, which used a unique population-based survey of rural women of reproductive age, we identified variables associated with mental health status on the basis of 3 indicators of mental health. Rurality of residence had some relation to mental health status: evidence was found that residing on a farm may be protective of overall mental health for rural women and that the most isolated rural areas may reduce access to diagnostic services for depression. More research is needed to understand the specific stressors and stress modifiers that affect mental health

status among women residing in various types of rural communities and to disentangle possible explanations for the effects of rurality on mental health. ∎

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Contributors

M.M. Hillemeier contributed to the design and implementation of data collection, conceptualization of the research, and interpretation of the findings and led the writing of the article. C.S. Weisman contributed to the design and implementation of data collection, conceptualization of the research, interpretation of the findings, and the writing of the article. G.A. Chase contributed to the design and implementation of data collection and led the formulation of the analysis plan and the interpretation of the findings. A.-M. Dyer contributed to the analysis plan, carried out the analyses, and contributed to the interpretation of the findings.

Human Participant Protection

This research was approved by the Pennsylvania State College of Medicine institutional review board.

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